Space Weather Technical Forecast

Issued on Wednesday, 10 August 2022 at 01:09 Local

This technical forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

Space Weather Forecast Headline: Reducing Chance of further Minor Geomagnetic Storms through period. Active electron fluence.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity has been Very Low over the past 24 hours, with only B-class flares recorded at GOES16. There are currently five numbered sunspot regions on the visible disc, with a new region transiting around the southeastern limb. Most spots were single uni-polar types and either stable or fading, with only the newly numbered bi-polar southern region, 3077, potentially showing some spot proliferation.

No Coronal Mass Ejections (CMEs) were visible in available imagery.

Solar Wind / Geomagnetic Activity: Earth continues to be under the influence of fast winds from a positive polarity coronal hole. The source of this is becoming less certain, but is most likely to be CH10/+. the phi angle has been accordingly positive (towards the Sun) throughout the 24 hours.

The solar wind speed, as recorded at L1 by DSCOVR and ACE was mainly in the range 550-600km/s. The solar wind density was steady at average levels. The total magnetic filed strength, Bt, of the IMF was at weak levels with small fluctuations, and a peak of 8nT. The Bz component was in the range +6 to -7nT, with frequent fluctuations in the north-south component, but with the south orientation more dominant. The phi angle has been positive (away from the Sun). Geomagnetic activity was mostly Unsettled to Active (Kp 3 to 4).

Energetic Particles / Solar Radiation: The high energy proton flux (greater than 10 MeV), as measured by GOES16, was at Background levels.

The high energy electron flux (greater than 2 MeV) was at Moderate to High levels, with a peak of 7180pfu at 09/1505UTC. The 24-hour integrated electron fluence rose through the period, with 2.08e8 integrated pfu observed at 10/0000UTC.

Four-Day Space Weather Forecast Summary

Solar Activity: Solar activity is likely to be Very Low or Low, with a Slight Chance of isolated C-class flares.

Solar Wind / Geomagnetic Activity: No CMEs feature in the current forecast.

Geomagnetic activity is thought likely to carry a risk of G1 through midweek as a result of elevated solar winds from CH10 and perhaps CH12. Solar winds may remain slightly elevated later this working week, before declining into the weekend as the coronal holes rotate away westwards. The associated threat of any further G1 should also recede, with Quiet to Unsettled conditions returning.

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Energetic Particles / Solar Radiation: The high energy proton flux (greater than 10 MeV) is expected to remain at Background levels.

The high energy electron flux (greater than 2 MeV) is likely to continue at mostly high levels for much of the next few days, but with an overall reducing trend towards the end of the period.

The associated fluence, now at Active (1e8 integrated pfu) levels, is expected to gradually trend upwards through days 1 and 2 (10th and 11th), probably peaking day 2. By day 4 (13th) fluence levels should be reducing but are likely to still be at Active levels. REFM model output appears to give good guidance at present.

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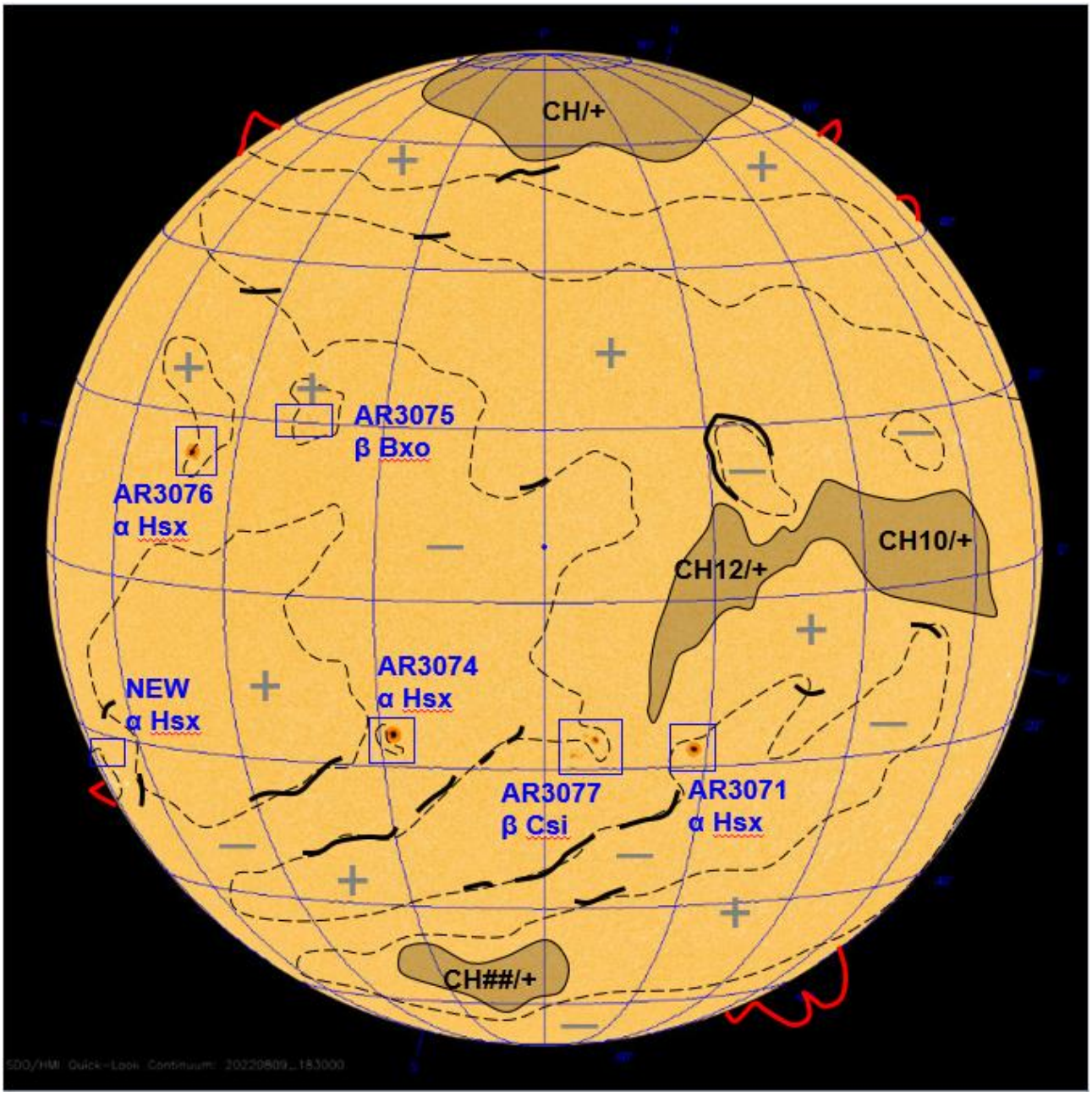
Figure 1. Solar Analysis Valid 09/1900 UTC.



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Key: Filament ___ , Prominence ___ , Magnetic Field Line - - - , Polarity +/-, Coronal Holes: Grey shaded area CHxx +/-, Sunspot groups 25xx - Mt Wilson α-β-βγ-βγδ and Zurich-McIntosh Axx etc.

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Geomagnetic Storms:

No CMEs feature in the current forecast, all previous filament lift-offs have been modelled as not being Earth-directed.

Solar winds are forecast to be Elevated for the next few days due to ongoing high speed stream influences from CH10/+, and perhaps CH12/+. This final coronal hole appears to have opened up late in the past UTC weekend close to the central meridian and may now give a more protracted spell of fast winds. However, confidence in CH12/+ being geoeffective is lower as it may have opened too late to manifest at Earth, as any fast wind emanating from CH12 will have a transit time to 1AU. There remains no obvious sign at STEREO A, two days upwind, although this satellite would be even less likely to see any fast wind from this feature.

Geomagnetic activity is thought likely to carry a risk of G1 through midweek as a result of CH10 and perhaps CH12. Solar winds may remain slightly elevated later this working week, before declining into the weekend as the coronal holes rotate away westwards. The associated threat of any further G1 should also recede, with Quiet to Unsettled conditions returning.

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	20	10	5	1
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Geomagnetic Activity - Earthbound Coronal Mass Ejections

None expected.

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Met Office Space Weather Technical Forecast

Radio Blackouts - X-Ray Flares:

Solar activity has been Very Low over the past 24 hours, with only background activity observed. Little change is currently expected in the forecast period, with a Slight Chance of isolated C-class flares.

There are currently five numbered sunspot regions on the visible disc, with a new region transiting around the southeastern limb. Most spots were single uni-polar types and either stable or fading, with only the newly numbered bi-polar southern region, 3077, potentially showing some spot proliferation.

There are hints on STEREO A EUVI 195 imagery of a further two bright flux regions waiting to rotate over the eastern limb in the coming days, however any contribution to flare risk will be assessed as and when any region(s) appear for analysis.

X Ray Flares	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability			(%)	(%)	(%)	(%)
Active	R1-R2 M Class	No	5	5	5	5
Very Active	R3 to R5 X Class	No	1	1	1	1

Solar Radiation Storms - (High Energy Protons):

The high energy proton flux (greater than 10 MeV) is currently at Background levels, and is expected remain at this level through the period barring development of significant sunspot regions.

Radiation Storms	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability (Exceedance)			(%)	(%)	(%)	(%)
Active	≥ S1	No	1	1	1	1
Very Active	≥ S3 *	No	1	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

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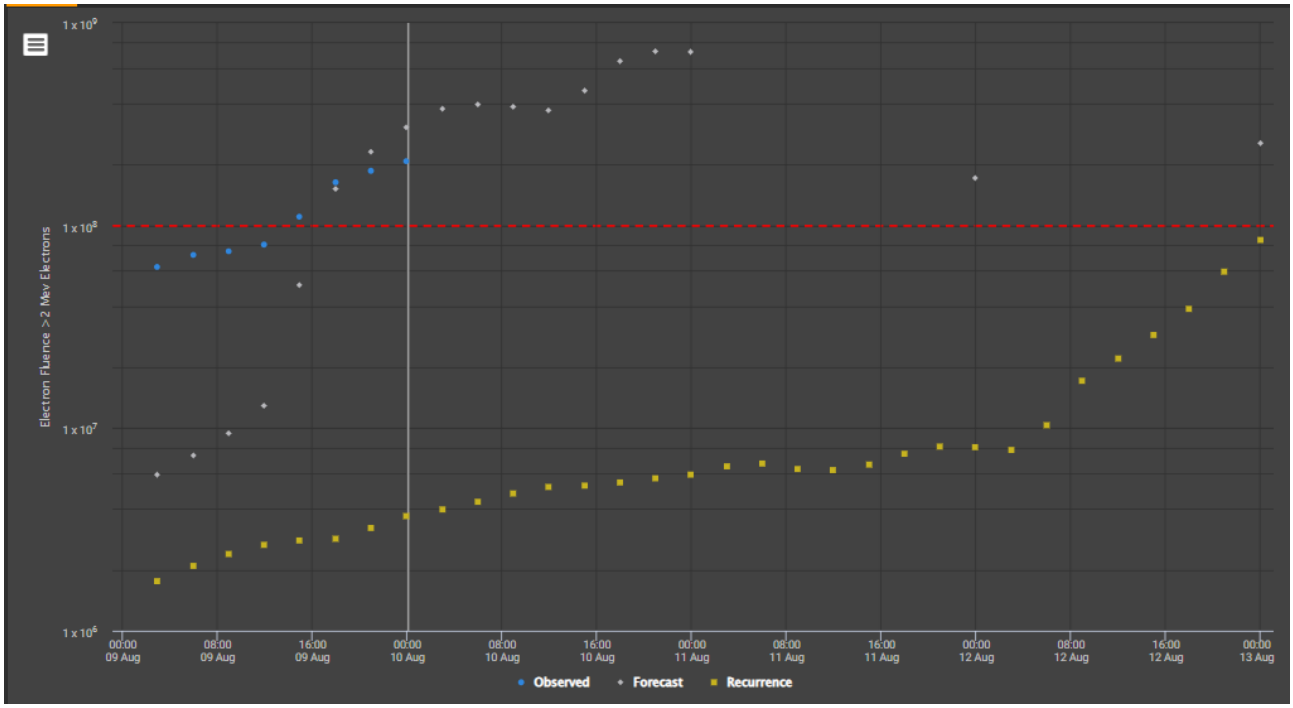
High Energy Electrons Event (≥ 2MeV):

The high energy electron flux (greater than 2 MeV) has recovered to high levels following a reduction earlier in the UTC day, with an overall upward trend. Mostly high flux levels are expected to continue for much of the next few days, but with an overall reducing trend towards the end of the period. There also remains the threat of further geomagnetic activity which may serve to temporarily lower counts at GEO.

Fluence has risen to Active levels, with a gradual upward trend likely to continue through days 1 and 2 (10th and 11th), probably peaking day 2. By day 4 (13th) fluence levels should be reducing but are likely to still be at Active levels. REFM model output appears to give good guidance at present.

GEO Electron Environment	Level (cm^{-2} sr^{-1} day^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability (Exceedance)			(%)	(%)	(%)	(%)
Active	≥ 2 MeV ≥ $1x10^8$	Yes	99	90	80	60
Very Active	≥ 2 MeV ≥ $1x10^9$	No	5	10	5	1

Figure 2: Latest REFM output.



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